UNIT 6 ANIMAL HUSBANDRY

Structure

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6.1 INTRODUCTION

The origin of livestock wealth is as old as the evolution of human society. In fact, this living wealth and the human society are interdependent. There is no denying the fact the livestock wealth apart from being the main source of National health is a to ok of economic prosperity specially in a country like India, where about 82 percent of the p opulation is ruralite and the economy is agro-based. The present status of animal husbas ndry and dairy enterprise has emerged out of age old development activities.

In this unit, not only the dairying activity, but all the allied activities like poultry development, piggery development, sheep development, fisheries developm ent, dairy industry and cattle insurance have been taken.

Objectives

After studying this unit, you should be able to

- explain present system of dairy farming in India,
- list various dairy products,
- discuss development of dairy industry in different five year plans,
- describe the present status of poultry, sheep, piggery, cattle and fisher y farming,
- discuss the role of insurance in dairying, and
- discuss problems and prospects of dairy industry.

6.2 DAIRYING/DAIRY FARMING

This section deals with the history of cattle and buffaloes, their classification acco rding to the purpose of keeping cattle, milk production and its utilisation, animal by-produc ts, cattle breeding and dairy industry.

The Pre-historic Draft Concept

Indian cattle cannot be studied without delving deep into over 5000 years of history and understanding the cattle needs of the country of those days. There has been little chan ge since then. The source of information in this regard is fortunately available in graphic form from the excavations made some years ago of the superimposed cities of the Indus Valley

civilisation (3300 B.C. to 2700 B.C.) at Mohenjo-daro in Sind and at Harappa in west Punjab. Both these places have gone to Pakistan after partition. These excavations have revealed many interesting features of our civilisation. Among the items unearthed are many square and rectangular seals on coloured earthenware and ivory, having figures of several animals.

A very large number of seals have been found throughout the whole complex of Indus Valley site. At Mohenjo-daro alone, over 1,200 of them were found. The seals are generally intaglio and the designs include a wide range of animals associated, in almost every case, with groups of signs in a semi-pictographical script.

The animal frequently represented is an ox-like beast seemingly with a single horn. Next in popularity is the short-horned built (gaur) with a wrinkled neck, and lowered head twisted slightly towards the spectator. Next in order is the Indian humped bull with a pronounced hump, heavy dewlap, a pronounced muscularity and dignified stance.

Farms and Farmers

According to the census of India, of the 845 million people, 75 per cent live in rural areas in about 5,76,000 villages. Table 6.1 reveals that the total cropped area is 163 million hectares. India is a country of small farms. According to 1980-81 census, the total number of farms in the country are around 89.4 million. The average size of operational holding is about 1.82 hectares. The marginal and small farms (0.1 to 2.0 hectares), which constitute about 75 per cent of the operational holdings cultivate only 26 per cent of the total cultivated area. Fourteen per cent of the lower medium farms having land between 2.0 to 4.0 hectares, cultivate 21 per cent of the total cropped land. As compared to this, 2 per cent of the large farms having operational holding more than 10 hectares cultivate 23 per cent of the total cropped area. This extreme inequality in the present distribution of land in the country emphasises the basic problem of small holders.

Table 6.1 : Number and Area of Operational Holdings in India

Category of Farm	Total No. of Operational Holdings (millions)	Total Area (million hectares)	Average Size of Holding (ha)
Marginal (Upto 1 ha)	50.88 (56.58)	19.73 (12.12)	0.39
Small (1-2 ha)	16.10 (18.02)	23.01 (14.14)	1.43
Lower/semi medium (2-4 ha)	12.48 (13.96)	34.53 (21.21)	2.77
Medium (4-10 ha)	8.08 (9.04)	48.32 (29.69)	5.98
Large (above 10 ha)	2.15 (2.40)	37.77 (22.84)	17.29
All	89.39 (100)	162.76 (100)	1.82

Size of Bovine Population and Its Composition

Table 6.2 reveals the size and composition of bovines in the year 1972, 1977 and 1982. It could be observed from the table that the bovine population has increased from 236 million in 1972 to 242 million in 1977 and again to 254 million in 1982. Again out of this 254 million bovines, 189 million were cattle and the remaining about 65 million buffaloes. The proportion of breedable cattle and buffaloes was observed to be 31 and 50 per cent, respectively. The respective figures during 1977 were 32 and 51 per cent, which showed almost similar trend. These 59 million breedable cows and 32.5 million breedable buffaloes produce about 65 million tonnes of milk annually. These cattle and buffaloes are of different breeds and species and belong to various parts of the country. The details of

the livestock population in various states of the country for cattle and buffaloes has been given in Table 6.3 and 6.4.

Table 6.2: Size of Bovine Population and its Composition in India

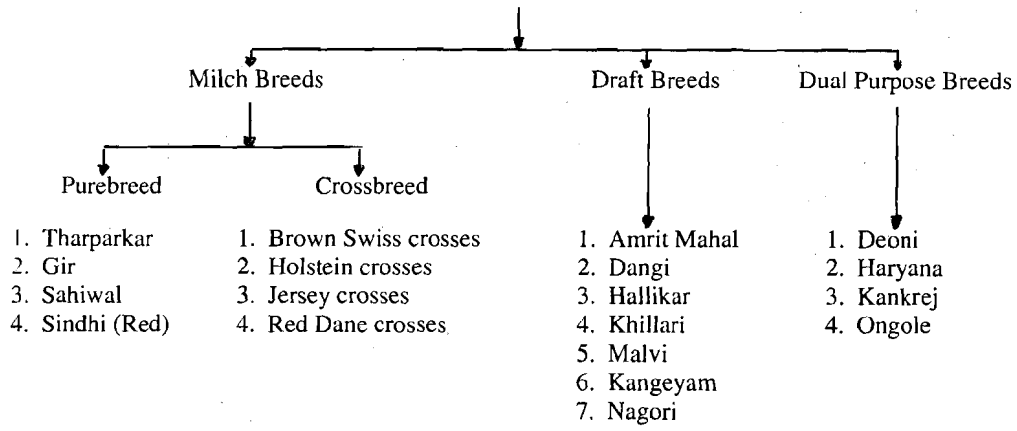
Particulars	Males			Females			Young Stock			Total		
Year	1982	1977	1972	1982	1977	1972	1982	1977	1972	1982	1977	1972
Cattle	72.84	74.46	74.46	56.68	57.84	56.40	56.98	47.39	47.48	188.50	180.00	178.34
Buffaloes	7.96	8.36	8.07	32.50	31.90	29.24	24.72	21.70	20.12	65.18	61.96	57.43
Total	80.80	82.82	82.53	89.18	89.74	85.64	81.70	69.09	67.60	253.6	241.9	235.7

The various breeds of cattle and buffaloes have been characterised as milch breeds, draft breeds and dual purpose breeds.

Classification of Cattle Breeds

There are about 25 distinct breeds of cows in our country—the largest number in any country or continent in the world. Most of the Indian breeds take their name from the geographical areas where they are produced and concentrated in pure form. Classification of various breeds and the details regarding each breed from the various categories is given below:

Classification of Cattle Breeds



The Dairy Breeds

Dairy breeds are those breeds which are maintained mainly for milk production and the major attention is paid towards female calves. These include:

Tharparkar or Thari

The name Tharparkar or Thari is linked with the district of Tharparkar in Sind, now in Pakistan. There are just a few herds of this breed in India. Its colour is white and grey and the animals are large in size. This breed is also being used extensively for crossbreeding by the Military Dairy Farms all over the country. It is a heavy milker and capable of yielding more than 3,000 litres of milk in a lactation.

Gir

The Gir is truly an Indian dairy breed found in large numbers in Gujarat. There are also some fine herds in other states. This breed is large in size and has a good potential for further improvement. It is being used for crossing our non-descript cattle. But sufficient attention has not been paid in this direction. The ancient breeders apparently knew the qualities of Gir better; they had used it for grading up other breeds like Dangi and Deoni.

Over 80 years ago, the Brazilian breeders were also impressed by this breed and imported this breed for the first time in 1890. It is spelt there as "Gyr". They have bred extensively from these animals for beef production. The Gir blood has also helped to produce immunity in their own cattle against certain local diseases.

There are several well established Gir herds in the country, giving as much as 3,000 kg of milk per lactation with over 4.5 per cent fat and 9.00 per cent Solid non-fat (SNF).

Sahiwal

This breed belongs to Sahiwal district now in Pakistan. It is a heavy milker giving up to 3,500 kg and is very loosely built. Most cows are brown but there are colour variations from white to black. The horns are very short and the udders well developed.

Sindhi (or Red Sindhi)

Like the Tharparkar and Sahiwal, the Sindhi is also now no longer an Indian breed, as the breeding areas, Sind and Baluchistan are now located in Pakistan. But there are a few Sindhi herds in the country, and the military dairy farms used this breed extensively for crossing with exotic bulls. A regular milker and breeder, it has a fine brown coat, as fine as that of a horse. Well-kept herds would yield on an average more than 2,500 kg of milk in a lactation. Like the Gir, it is also a very docile breed.

Table 6.3: Cattle Population of India

(thousands)

State/Union Territory	1951	1956	1961	1966	1972	1977	1982	1987
Andhra Pradesh	12249	11276	12342	12342	12507	12041	13220	12374
Arunachal Pradesh	-	-	-	-	174	168	168	312
Assam	5145	5309	6489	6563	5796	6603	6750	7278
Bihar	14576	14398	16104	15157	14911	14543	17527	20841
Gujarat	-	-	6557	6544	6457	6006	6994	6240
Goa	-	-	-	-	124	122	132	112
Haryana	-	-	-	2227	2451	2442	2342	2201
Himachal Pradesh	1115	1171	1213	1891	2176	2106	2174	2245
Jammu & Kashmir	1321	1757	1840	1791	2057	2038	2325	2765
Karnataka	8960	8966	9673	9686	10019	10222	11300	10175
Kerala	2151	2510	2753	2857	2856	3006	3097	3424
Madhya Pradesh	21128	22640	24774	24644	26461	26253	27117	28549
Maharashtra	18955	20216	15338	14729	14705	15218	16162	16980
Manipur	144	265	293	288	294	294	747	770
Meghalya	-	-	-	-	468	477	550	587
Mizoram	-	-	-	-	25	49	49	50
Nagaland	-	-	-	76	89	93	151	203
Orissa	7889	7862	9809	10628	11496	12120	12930	12576
Punjab	5757	5948	6059	3162	3390	3302	3263	2832
Rajasthan	10765	12073	13137	13124	12469	12869	13505	10922
Sikkim	-	-	-	-	-	158	173	184

State/Union Territory	1951	1956	1961	1966	1972	1977	1982	1987
Tamil Nadu	10216	9698	10826	10859	10573	10801	10365	9353
Tripura	191	303	495	588	525	592	680	828
Uttar Pradesh	23513	23022	26283	26120	26217	25773	26152	26323
West Bengal	11106	11108	11476	12576	11878	11878	15658	20311
Union Territories	-	-	-	-	-	-	-	-
Andeman Nikobar Islands	2	4	7	10	19	27	36	45
Chandigarh	-	-	-	8	5	3	7	6
D & N Haveli	-	-	-	38	40	38	45	46
Delhi	107	120	94	76	68	49	52	55
Lakshyadeep	-	1	1	1	1	1	3	3
Pondicherry	-	-	-	72	90	92	93	89
All India	155295	158650	175557	176057	178341	180140	192453	199667

Table 6.4: Buffaloe Population of India

(thousands)

State/Union Territory	1951	1956	1961	1966	1972	1977	1982	1987
Andhra Pradesh	6583	5968	6949	6791	7057	7163	8704	8757
Arunachal Pradesh	-	-	-	-	9	12	12	12
Assam	475	521	583	581	489	730	558	623
Bihar	3197	3426	3698	3654	3679	3602	4641	4872
Gujarat	-	-	2617	3140	3468	3463	4443	4502
Goa	-	-	-	-	38	40	44	41
Haryana	-	-	-	1935	2518	1940	3369	3828
Himachal Pradesh	175	206	205	416	544	560	616	795
Jammu & Kashmir	296	374	401	428	493	500	563	567
Karnataka	2556	2669	3026	2946	3216	3278	3648	4037
Kerala	444	488	485	471	472	454	409	329
Madhya Pradesh	4818	5008	5576	5607	5695	5845	6435	7351
Maharashtra	5146	5337	3087	3042	3301	3899	3972	4752
Manipur	17	52	55	48	52	52	138	141
Meghalya	-	-	-	-	46	40	29	28
Mizoram	-	-	-	-	2	2	4	6
Nagaland	-	-	-	4	8	8	9	15
Orissa	893	829	1075	1269	1399	1359	1333	1508
Punjab	3377	3810	4445	2983	3795	4110	4590	5577

State/Union Territory	1951	1956	1961	1966	1972	1977	1982	1987
Rajasthan	3046	3439	4019	4222	4593	5072	6043	6344
Sikkim	-	-	-	-	-	5	4	3
Tamil Nadu	2297	2041	2594	2724	2853	3077	3212	3128
Tripura	28	40	43	50	20	14	16	16
Uttar Pradesh	9250	9798	10976	11426	12592	13965	15785	18239
West Bengal	738	789	786	1043	824	824	987	2264
Union Territories:								
Andeman Nikobar Islands	4	5	8	8	8	10	12	14
Chandigarh	-	-	-	16	11	12	19	21
D & N Haveli	-	-	-	4	3	3	3	4
Delhi	56	115	100	103	128	109	177	285
Lakshyadeep	-	-	-	-	-	-	-	-
Pondicherry	-	-	-	10	12	10	9	10
All India	43400	44910	51211	52920	57426	62024	69783	76967

Crossbred Crosses

For meeting the targets of milk enhancement for the increasing demand of increased population, the crossbreeding of Zebu cattle with dairy breeds from temperate countries is the only solution. The crossbreeding technique makes the gene migration comparatively easy for developing new breeds of cattle from local cattle. The crossbreeding has been successful in the most progressive areas where conditions for raising high yielding cattle are optimum. So far a number of new breeds have been developed in the country, the details of which are given below.

Brown Swiss Crosses

The Brown Swiss crosses, which are also known as Karan Swiss breed have been developed at National Dairy Research Institute, Karnal. These are medium in weight and are capable of yielding more than 3,300 kg of milk in a lactation and are available in Haryana. Brown Swiss crosses are also found in good number in Kerala state since under the Indo-Swiss project, the local breed is being crossed with Swiss bulls. The breed at Karnal has been evolved by crossing the local Sahiwal and Red Sindhi cattle with the Brown Swiss semen. Interestingly, all these crossbreeds are dehorned at birth and has no hump.

Holstein Crosses

The Holstein Friesian crosses which too have been developed at Karnal and are available in plenty in the area are the offsprings of local cattle and Holstein Friesian bulls. These are also known as Karan Friesians. These are heavy in weight (around 500 kg) and heavy yielders too (over 3600 litres). As compared to the local breeds, the fat content is less in this milk. Holstein crosses are available in large number in Haryana, Punjab, Uttar Pradesh and various other states. This breed is very heavy and hefty and hence suitable only for plains.

Jersey Crosses

The Jersey crosses are also the crosses of local cattle with Jersey breed. These are light in weight weighing about 300 kg and are capable of yielding about 2,800 kg of milk. These being light in weight are suitable for hilly areas. The fat percentage in Jersey milk can well

be compared with local cattle. These animals are available in most parts of the country since under the development schemes in the early days only Jersey bulls were being used for crossbreeding.

Red Dane Crosses

The Red Dane crosses have been developed in Bangalore area of Karnataka and around Ludhiana in Punjab. These too are medium in weight and yield around 3,000 kg of milk in a lactation.

The Draft Breeds

Draft breeds are mainly kept for producing male progeny for draft purposes. These categories of animals are rarely milked and the milk quantity which is very small is fed to the calvesonly. These include:

Amrit Mahal

The home of the Amrit Mahal is former Mysore state, which now forms part of Karnataka. This breed is light in weight, compact, fiery and speedy. It has very fine back sweeping, shapely and light-coloured horns. The owners keep them clean and polished. A bullock weighs about 300 kg. The Amrit Mahal is often used in light single bullock carts for human transport and trot as fast as ponies. The breed is known for its endurance and in olden days was used for pulling gun carriages.

Dangi

The Dangi is a medium sized animal inhabited in the hilly tract of the Dang forest of Maharashtra, an area known for heavy rainfall. The animals are hardy and are well suited for heavy rainfall tracts where small compacts animals are needed for puddling the rice fields. The predominant colour is brown or black spots on white body.

Hallikar

The Hallikar is the second breed coming from Mysore district and surrounding areas in Karnataka state. It is found all over south India and is the best all round draft breed. The Hallikar requires several months to train and develop into good bullocks. They are slow to mature.

Kangeyam

The Kangeyam comes from the district of Coimbatore in Tamil Nadu. The cows are rarely milked, but the bullocks are well suited for heavy ploughing and road transport.

Khillari

The Khillari is a breed which originated in the old Mysore state, but is now available in abundance in Sholapur and Satara districts of Maharashtra. Though the bullocks are slightly heavier, but they work well.

The Amrit Mahal, Hallikar, Kangeyam and Khillari breeds have great similarity. They are distinctive in the shapely horns slanting somewhat towards the hump, have long faces and compact bodies. They are different from the breeds found in the north of India.

Malvi

The Malvi breed is found in large numbers in the area previously known as Central India, now Madhya Pradesh. Its home tract is located in black cotton soil and ploughing this soil calls for strong powerful bullocks. The horns are generally black and upright.

Nagori

The home of Nagori breed is the Nagore district in Rajasthan. It is a large, long, tall and heavy breed. The bullocks are capable of ploughing in light sandy soil. They are also valued for fast road work. Many professional cattle breeders known as Banjaras drive the male calves to Gujarat and central India for sale.

Dual Purpose Breeds

These breeds are maintained both as a milch and draft breeds. The females of this breed are good in milk production whereas the males are second to none and are widely used for ploughing and other draft purposes. The breeds under this category include:

Deoni

The Deoni animals hail from hilly areas of the former Hyderabad state, now Andhra Pradesh. They are white in colour and seem to contain Gir blood in them. Deoni cows yield on an average 650 to 700 kg of milk in a lactation. The bullocks are good for draft purposes.

Haryana

The most important breed of the north India is the Haryana breed. It is spread over several districts of Haryana, viz., Rohtak, Karnal, Hisar and Gurgaon. Many of these animals are also found in Union Territory of Delhi and adjoining districts of west Uttar Pradesh but the better animals are available only in Hissar and Jind areas or away from the Jamuna river. It is large size breed, varying in colour from white to grey and produces very tall and smart looking bullock. The cows yield around 1500 kg and a large number of animals have been kept on the organised and government farms all over the country. Many Haryana bulls have also been used for crossing the small short-horned cows of Bengal.

Kankrej

The home of this breed is in the sandy area of North Gujarat. This is the most showy breed of all Indian cattle. The horns and heads of some of the animals are just magnificent and picturesque. Well-to-do farmers take great pride in matching the bullocks in a pair. They look like identical twins. A mature cow weights around 500 kgs. It yields around 1,000 kgs in a lactation. The colour varies from white to grey, but the bulls could be completely black, with only the barrel being grey in colour.

Ongole

The Ongole breed is also known as Nellore after a district by that name in Andhra Pradesh. It is medium to heavy in weight and white in colour. Cows are fair to good milkers with average yield being around 1,600 kg of milk in a lactation. Average fat content of milk from an Ongole cow is 5.0 per cent, and calving interval is about 16 months.

This breed has also been imported by Brazilians where it is known as Nellore. They have also been taken to Indonesia for pure breeding and grading up their local cattle. In Java, they have been used for improving the draft qualities of the local cattle.

The Buffalo Breeds

The buffalo is also a native of India and belongs to the family of the ox (bovine). From time immemorial, it has been domesticated in India and has been introduced in other countries such as Burma, Egypt, Italy, Hungary and Malaysia, etc. A large number of buffaloes of good quality have been exported to Russia also. Description of some of the buffalo breeds being bred and produced in India is given below:

Jaffrabadi

The Jaffarabadi animals are also sometimes called Gir buffaloes. In the earlier days, before the advent of railways, Jaffarabad was the nearest source from where buffaloes were brought by country boats for the milk stables in Bombay city. Because they were shipped from Jaffarabad, the breed acquired the name Jaffrabadi, though in Jaffrabad itself, there are hardly any buffaloes. Their home tract is about 200 km north of Jaffrabad.

Milk obtained from a Jaffrabadi buffalo is extremely rich in fat - average fat being 7.5 per cent, but the milk fat of individual animals sometimes touches 11.0 per cent mark, particularly towards the end of the lactation period.

One of the characteristics of this breed is that after a few weeks of calving, animals tend to yield milk only once a day and have a very long lactation. They also become irregular breeders even in their home tract. A lactation yield of 4000 kg (in 330 days) of 7.0 per cent milk fat is not uncommon.

Mehsana

Mehsana is the name of a district in Gujarat and are light coloured, compact and good milkers. The average yield is 2,000 kg of milk, but the fact content is high. Most animals have a collar of light colour hair (varying on white) around the neck reaching the shoulders. Some of the animals have Murrah blood in them, but are neither black in colour nor so heavy.

Murrah

Murrah is India's largest breed of quality buffaloes. It is spread over the whole of Punjab, Haryana, Delhi, North-east Rajasthan and Western Uttar Pradesh. Murrah buffaloes can be found in almost every nook and corner of India. It is the only breed that has been taken to all parts of India for producing milk in the cities. The animals have also been taken outside India. They are essentially studied to stall feeding. A full grown she-buffalo weighs about 650 kg. There has also been grading up of other breeds with Murrah but this has been done in an unsystematic manner. The average lactational yield is between 1,800 and 2,000 kg but individual animals have yielded upto 4,500 kg milk in a lactation. Fat content is well above 6.5 per cent. The females have a very pronounced wedge-shaped body. The animals respond very well to good feeding and management conditions.

Nagpuri

Nagpuri buffaloes are generally of lighter types but some of them are as large as the Murrahs. Some of the animals are very docile and get so accustomed to city conditions that they can be taken from door to door for milking and supply of milk to the consumers. The animals yield around 1200 kg of milk in a lactation. The fat per cent of this breed is around 6 percent.

Nili

The main population of the Nili breed is now in Montgomery district of West Pakistan, but large number of buffaloes are found along the Pakistan border in Ferozepur district of India. The breed is like the Murrah and is said to contain Murrah blood in it but has shorter horns, fine bones and white hair on the forehead, legs and the tail switch. It has also very light eyes. Its milk yield and other economic characteristics are the same as that of an average Murrah buffalo.

Surti

The Surti breed is found not only in Surat district, a coastal town, but also in northern districts of Gujarat including Kaira district. It is a good compact animal, regular milker and breeder. It is also known charotar breed, in the tubewell irrigated belt in north Gujarat. There is also the Mehsana breed in north Gujarat closely resembling the buffaloes in the southern part of the state. Most of the animals are lighter in colour but due to some admixture with the Murrahs, darker animals can be also found in the area.

Milk Production

Estimates of milk production have been made by various agencies at different points of times. These are based mainly on the number of livestock as per the census conducted at 5 year intervals and the data on days in milk, dry days, intercalving period, milking average ascertained by sample surveys.

Central Statistical Organisation prepared the estimates of milk production and the projections have been made up to 2000 A.D. The trends in milk production and the per capita availability of milk has been given in Table 6.5.

The milk production taking 1940 as the base has increased by about 204 per cent in the year 1989-90 and is expected to increase to 280 per cent in 2000 A.D. The increase in the initial stages was very low but has picked up from 1980-81 onwards. Since then the milk production is increasing rapidly and at a faster rate.

Table 6.5: Trends in Milk Production, per Capita Availability and Milch Animal Productivity Since 1951

Year/Fiscal year	Milk Production million tonnes	Percentage Increase over 1940 Base of 17.10 million tonnes	Per capita milk availability (g/day)
1940 (base year)	17.100	-	-
1951	17.406	1.7	132
1961	20.375	19.1	127
1971-72	22.500	31.5	112
1980-81	31.500	84.1	128
1981-82	32.500	92.3	132
1982-83	34.600	102.3	132
1983-84	36.300	112.3	135
1984-85	38.000	122.2	142
1989-90	52.000	204.1	165
2000	52.000	280.1	180

Source: Ministry of Agriculture, Department of Agriculture and Co-operation, Govt. of India, *Annual Report*

The per capital availability of milk was estimated to 132 kg in 1951 which showed decreasing trend up to 1971-72 as the increase in milk was not in proportion to the increase in human population. It showed an increasing trend after 1971-72 but the increase was well marked only from 1984-85 onwards. It is expected that the per capita availability will increase to 180 g per day by the year 2000 A.D. which again is far below the per capita requirement of 210 g. The nutritional experts of the Indian Council of Medical Research have recommended 300 g of milk for pre-school children, 250 g for school children in the age group of 7-12 years and for boys and girls from 13 to 18 years of age, and 200 g for adult men and women. For expectant mothers, an additional allowance of 150 g was recommended. These recommendations were made for the genetarian population. For non-vegetarian population, the requirement ranged from 100 to 200 g for various categories. It has been estimated that the population of the country would exceed 900 million people by the end of century and to provide this population with a standard diet as per the recommended nutritional requirement, milk production has to be increased to about 90 million tonnes annually.

Pattern of Milk Utilisation/milk Products

The milk is being consumed by the population not only in the fluid form, but is being converted into various products. The pattern of milk utilisation has been given in Table 6.6.

It could be observed from the table that 46 per cent of the total milk being produced in the country is being consumed as fluid milk, whereas 28 per cent is being converted into ghee.

Table 6.6: Milk Utilisation Pattern in India (%)
(Urbanised and Non-urbanised Sector)

	1951	1961	1986-87*	1987-88*
Liquid milk	39.3	45.1	46.0	46.0
Milk powder	-	-	3.4	2.6
Ghee	39.3	31.8	28.0	28.0
Butter	6.0	6.4	6.5	6.5
Khoa	4.4	4.7	5.5	5.5
Cream	0.5	1.9	0.5	0.5
Curd	8.8	8.1	7.0	7.0
Ice-cream	0.7	0.7	0.2	0.2
Cheese (including cottage cheese)	-	-	2.0	2.0
Others	0.4	1.2	0.9	1.7

**Estimated*
Source: XIV Dairy Industry Conference, *Dairying in India, 1991*

The percentage of milk being utilised in the form of butter, khoa and curd has been estimated as 6.5, 5.5 and 7.0 per cent, respectively. The remaining milk is being converted into milk powder, cheese, cream, ice cream and various other products.

The estimated production of milk products being manufactured in the organised sector have been presented in Table 6.7.

Table 6.7: Estimated Production of Milk Products (million tonnes)

Year	Powder	Butter	Ghee
1980	76,500	11,000	40,000
1982	84,500	5,000	50,000
1985	102,500	18,000	65,000
1988	135,000	19,000	65,000
1990*	145,000	24,000*	75,000*
1995*	155,000*	30,000*	90,000*
2000*	165,000*	40,000*	110,000*

Milk powder and baby food was being imported by our country in the past but since 1976-77 the import of these products has been stopped except for what we have received as donations under the Operation Flood Programme and we have become self-sufficient in its production. The quantity of milk powder production in the year 1980 was 76,500 metric tones which has almost doubled in 1990. The production of butter and ghee has also increased almost in the same proportion.

The prices of milk and milk products have been presented in Table 6.8. It reveals that the prices of milk, ghee and butter taking 1970 as the base have increased by about 480 per cent, 181 per cent and 476 per cent, respectively.

Table 6.8: Approximate Prices of Milk and Milk Products (in Rupees)

Year	Milk (litres)	Ghee (kg)	Butter (kg)	Groundnut Oil (bulk kg)
1960	1.20 (tonnes)	12.00	-	3.50
1970	2.00	18-20	-	5.00
1974	2.50	25-30	17.00	8.00
1980	2.90	42-45	28.00	14.00
1985	3.60	48-50	36.00	17.00
1988	6.00	60-65	55.00	27.00
1990*	7.00*	70-72*	63-65	30-32*
1995*	8.50*	80-85	70-75*	35-38*
2000*	10.00*	110-120*	100-110*	40-42*

**Estimated*
Note:Gujarat price
The trend is indicative for the country as a whole

6.3 ANIMAL BY-PRODUCTS

Animals are slaughtered primarily for obtaining meat for human consumption. Besides preparing meat, several organs of the slaughtered animals are useful provided they are carefully collected and preserved. The by-products from slaughter houses fall into two groups, the edible and the non-edible. The edible ones include tallow, Lard, guts, glands, tail stumps and blood. The non-edible ones include hides and skins, hair, bones, meat, etc. wastes, horns and hoofs. These by-products can be used for the production of various consumer goods such as sausage, casings, guts, pharmaceutical products, animal and poultry feeds, fertilizers etc.

Meat Production

Meat is not a staple diet of the people of India although consumption of meat production is on the increase. About 70 per cent of the total population is non-vegetarian. Of this, a large section has religious objection to the consumption of beed and a smaller section to pork. The total quantity of beef and buffalo meat produced during 1981-82 was 2,10,000 tonnes valued at Rs.900 crores. The ban on cattle slaughter partially in many states and total in some has been responsible for the steady decline in the production. On an average, about 14 lakh of cattle and buffaloes are slaughtered every year.

Hides and Skins

The term hide denotes the outer covering of large animals such as cows, buffaloes, horses, camels etc. whereas the term skin is applied to that of smaller animals, such as sheep, goats and calves. The hides and skins as such have limited applications, they are mainly used for manufacture of leather.

While most of the hides in other countries are the by-products from slaughter houses, in India hide production is confined mostly to the fallen hides collected from carcass of animals dying from natural causes.

The average mortality rate among livestock is estimated at about 8-10 per cent, or about 2 million animals per year. A large percentage of these carcasses is wasted as they are not collected in time and are not properly cured. Hides and about 60 percent of the bones of cattle, buffaloes and other wild animals are collected and the rest of the by-products viz., meat, fat, horns, hoofs, etc. are allowed to go waste. Most of the carcasses are reduced to heaps of bones by vultures and dogs or allowed to deteriorate on the spot where the

animals die. Proper utilisation of the carcasses can bring a return of Rs.40 crores annually to the country. Due to the non-utilisation of the valuable by-products which could be obtained from the carcasses, the net value of the wastes comes to the tune of about Rs.23 crores per annum. Out of this, loss due to non-utilized hides alone amounts to Rs. 4 crores. The hides of fallen animals are very often spoiled to such an extent that they cannot be converted into good quality leather. The annual loss, sustained on this account, is estimated at about Rs.3.4 crores.

In most countries, the proportion of hides produced or the number of animals annually slaughtered for meat to the total cattle population is quite appreciable. In Italy and USA, it is as high as 44.6 and 44.4 per cent respectively; it is lower in Africa with 9.2 per cent of the total. In India, the production from slaughtered animals is the lowest and represents only 5.7 per cent of the total population.

Indian's contribution to the world production of raw hides is 15.5 per cent. The annual production of kids and buffalo hides in India is about 16 and 5 million pieces, respectively, valued at over Rs.13 crores. Approximately, hides from only one-fourth of the total fallen cattle and buffaloes are collected, which are estimated to be 23 million pieces valued at Rs.27 crores.

Export of raw kids and buff-hides is generally prohibited but they are exported in the tanned state.

Carcasses Utilisation

Carcass utilization has gained much importance in the last three or four decades and the by-products of both slaughtered and fallen animals are being utilized to the maximum advantage. Various by-products that can be obtained from an average sized carcass of Indian cattle are given below :

Hides	-	11.3
Meat	-	90.7
Bones	-	18.1
Fat	-	2.3
Horns, hoofs and guts etc.	-	59.0

Fat

While the fat obtained from slaughtered animals is used for edible purposes, but fat recovered from fallen animals is used for making soaps, candles, grease etc. The estimated production of fat during 1972-73 was 61 million kg valued at Rs.8.9 crores.

Bones

Bones constitute an important livestock product. The bulk of the bones produced in India are from fallen animals. The annual availability of bones collected during 1967-68 was 4,26,000 tonnes and the collection was about 40 per cent. It is estimated that only a little over a third of the available quantity is collected, the remaining goes waste. In the last few years, the trade has picked up and the collection of bones has increased considerably.

Horns and Hoofs

Of the animals by-products salvaged from dead cattle and buffaloes, horns and hoofs occupy the third place of importance. About 63.5 per cent of horns from cattle, buffaloes and sheep valued at about Rs.65 lakhs and about 66 per cent of hoofs from cattle and buffaloes, goats, horses and pigs valued at about 33 lakhs are wasted. The production of horns and hoofs from cattle and buffaloes was estimated at about 35,000 and 28,000 tonnes, respectively during 1967-68. Wastage of 60 per cent in hoofs and 66 per cent in horns has also been ascertained.

Horns and hoofs meals, which are rich in nitrogen (14%) are in great demand in India for use as manure in tea gardens and coffee plantations. A small quantity of buffalo horns is used for the manufacture of combs, knife handles, snuff boxes, buttons, toys and fancy articles.

Guts

Guts are used as sausage casings for human consumption. Guts are obtained from intestines. Abut 90 to 100 per cent of large intestines of cattle and buffaloes and 80 per cent of small intestines of buffaloes are not utilized.

The production of guts from cattle and buffaloes in the country during 1967-68 was estimated at 48,398 tonnes.

Cattle Tail Hair

Hair from tail stumps of fallen and slaughtered cattle and buffaloes are used in making various types of brushes. The availability of cattle tail hair in the country during 1961 was estimated at about 288 tonnes, out of which about 30 tonnes were exported to West Germany, U.K., U.S.A. and France. But with the induction of nylon fibre, the industry has received a great set back and the export has been considerably reduced.

Blood

It is a valuable by-product of the slaughter houses. It is used as manure, blood meal of feeding animals and as human food mixed with minced meat for sausages; medicines and in industry. Albumin is used for gluing of plywood, dyeing of textiles and papers and door dressing leathers before dyeing.

The production of blood from cattle and buffaloes slaughtered in the country during 1967-68 was estimated at about 50,000 tonnes. The amount of blood wasted is more than the amount collected and the little that is collected is converted into blood meal, both for use as fertiliser and feeding poultry. Wastate is 64 per cent and valued at Rs.78.60 lakhs.

Blood (13% nitrogen) is used as fertilizer for citrus fruits, vegetables, tobacco, coffee plantations and tea-gardens and blood meal for poultry and pigs. Small quantities of blood have also been exported to U.K. and Germany in the past.

6.4 CATTLE BREEDING

The guiding factor in cattle breeding has been the urgent need for increasing the milk production in the country. The earlier cattle breeding policy advocated by the Indian Council of Agricultural Research and generally adopted in the country till very recently was to upgrade non-descript cattle with pure bred bulls of milch, dual purpose or draught breeds without impairing their draught capacity to any appreciable extent. No definite policy regarding breeding of buffaloes was, however, formulated.

A revised breeding policy was recommended for the improvement of cattle and buffaloes with the following features:

a) Selective breeding in the breeding tract of recognised milch, dual purpose and draught breeds of cattle.

b) Grading up with recognised dual purpose or dairy breeds in areas where cattle do not conform to any specific breed having low productivity.

c) Crossbreeding with exotic breed where there are facilities of rearing and maintaining high yielding milch animals, and

d) Improving buffaloes by selective breeding.

In pursuance of this policy, large areas have been covered by recognised dual purpose and dairy breeds like Haryana, Tharparkar, Gir, Sindhi and Sahiwal. Large tracts have been selected for crossbreeding with exotic breeds like Jersey, Holstein Friesian, Brown Swiss, Red Dane and Ayrshire. With the experience gained, the general recommendation for increasing the milk production is that the crossbreeding be taken up mainly with two breeds, i.e., Jersey and Hostein Friesian except in Kerala state where crossbreeding with Brown Swiss is going on.

6.5 DEVELOPMENT OF DAIRY INDUSTRY IN INDIA

Though some attempt was made in the preplan period to develop the dairying by setting up Military Dairy Farms in 1891, appointment of Dairy Expert in 1920 and starting the Dairy Education in 1922, but it received a fillip only after independence. When planned development of dairying was taken up under the First Five Year Plan, the deficiency of suitable marketing infrstructure was noticed. The producers in the remote areas were compelled to either consume the milk or convert it into ghee by desi method and sell ghee, which was unremunerative. To solve this problem, marketing schemes were evolved and the milk in the rural areas was diverted to cities. Rapid progress has been made by almost all the states in this direction. Milk factories have been established, and to cater to the need of these factories, collection and chilling centres have been established in rural areas. It would be of great interest to study the development made in the country over these years and the expenditure made. The outlay and expenditure on Animal Husbandry and Dairying during the plan periods have been summariesed in Table 6.9. It could be noticed from the table that in every plan the expenditure was far less than the proposed outlya. Again the expenditure made in the Seventh Plan was 80 times than the First Plan.

First Five Year Plan

Organisation of milk supply to Bombay and Calcutta were the two major programmes which were taken up during the First Plan by the Central Government. In addition to this, number of states had the programmes of dairy development which included the start of 27 town milk supply schemes at the cost of Rs.781 lakhs.

Second Five Year Plan

Broad features of the Second Plan included (i) starting the organised milk marketing in 36 cities having a population of more than one lakh each, (ii) utilization of surplus milk available in relatively remote pockets by setting up 3 rural creameries and 3 milk product factories, (ii) Dairy Education was taken up by expansion of National Dairy Research Institute at Karnal and Bangalore and setting up the regional stations at Bombay and Calcutta, and (iv) setting up Dairy Science College at Karnal. The Second Plan in general was not a success and not much could be accomplished.

Table 6.9: Outlay and Expenditure on Animal Husbandry and Dairying in the Various Plans

(Rs. million)

Plan Periods	Animal Husbandry		Dairying		Animal Husbandry and Dairying	
	Approved Outlay	Expenditure	Approved Outlay	Expenditure	Approved Outlay	Expenditure
First plan (1951-52 to 1955-56)	141.9	82.2	78.1	77.8	220.0	160.0
Second Plan (1956-57 to 1960-61)	385.0	214.2	174.4	120.5	559.4	334.7
Third Plan (1961-62 to 1965-66)	544.4	434.0	360.8	336.0	905.2	770.0
Annual Plan (1966-67 to 1968-69)	413.3	340.0	261.4	257.0	674.7	597.0
Fourth Plan (1969-70 to 1973-74)	941.0	755.1	1390.0	787.5	2331.0	1542.6

Plan Periods	Animal Husbandry		Dairying		Animal Husbandry and Dairying	
	Approved Outlay	Expenditure	Approved Outlay	Expenditure	Approved Outlay	Expenditure
Fifth Plan (1974-75 to 1977-78)	3095.6	1784.3	1279.8	540.3	4375.4	2324.6
Annual Plan (1978-79)	NA	461.0	NA	404.2	1264.8	865.2
Annual Plan (1979-80)	543.9	468.8	651.9	753.7	1195.8	1222.5
Sixth Plan (1980-81to 1983-84)	3896.4	3662.2	4603.0	4362.9	8499.4	8025.1
Seventh Plan (1985-86 to 1989-90)	11584.5	6770.9	7617.9	6034.1	19102.4	12805.0

NA : Not available
Source: Annual report of the Ministry of Agriculture, Department of Agriculture and Cooperation, Government of India and Planning Commission documents.

Third Five Year Plan

In the Third Plan, financial allocations were doubled and it envisaged the speedy development of dairying and the targets were fixed to establish 55 milk supply schemes, 8 creameries, 6 milk product factories, 2 cheese factories and 4 cattle feed plants. It was also envisaged to complete all the projects started in the Second Plan. Emphasis was also laid on conducting the surveys, disbursing of loans for purchase of animals and training of personnel. This plan also feel short of accomplishments and only 30 milk supply schemes, 4 milk product factories, 3 creameries in addition to 37 schemes started in the earlier plans could be completed.

Fourth Five Year Plan

The Fourth Plan laid emphasis on consolidation of results of the previous plans and speedy development of milk producers co-operative societies. Under this plan, it was decided to implement 33 projects already taken up in the Third Plan, expansion of 62 dairy schemes due to be completed by the beginning of Fourth Plan, establishment of 4 product factories, 24 milk supply schemes and 64 rural dairy centres for areas having population less than 50,000 each.

It is in this plan that a strategic project by the name of 'Operation Flood' was taken up. It was proposed to form 18 Anand Pattern dairy co-operatives in the hinterland milk shed areas of metropolitan cities. For the implementation of this project, funds were to be generated by importing skimmed milk powder and butter oil from abroad received as free gift, reconstituting this into liquid milk and marketing in urban areas.

In order to make the country self-sufficient in the production of milk products, private sector was also encouraged to set up the factories for the manufacture of milk powder, infact milk food, malted milk and condensed milk.

Fifth Five Year Plan

It was proposed to take up 64 liquid milk plants, 11 milk product factories and 127 rural dairy centres. It was also envisaged to complete 36 spill over schemes and factories. Importance of dairy development was fully recognised in this plan and two World Conference on Dairying were conducted in India with the basic theme of "Dairying as an instrument of social and economic change".

Sixth plan aimed at achieving the basic objectives of planning and the stress was laid on social justice. In this plan, emphasis was laid on production, processing and marketing of milk. To increase the milk production, cattle development programmes were taken up to change the structure of bovine population by replacing the existing low producing milch cattle by crossbreeding with exotic blood. It also laid stress on extension education. In the processing field, emphasis was laid on the collection of milk directly from producers and formation of milk co-operative societies. In this plan also, the Operation Flood-II programme was taken up with the basic objectives of (i) extending the dairy co-operatives structure to cover 10 million rural milk producing families, (ii) rearing 10 million crossbred cows and upgraded buffaloes, (iii) to enable the regional milk grids to develop and coalesce into National Milk Grid, (iv) linking of all major urban demand centres with the rural milk sheds, (v) augment the dairy processing capacities in the rural milk sheds, and finally, (vi) to strengthen the consultancy and executive development services.

In short, under the Plan period lot of progress has been made. To review the results, it could be ascertained that by 1990 in the country, 275 liquid milk plants with an installed capacity of 200 lakh litres were set up. In addition to this, 83 milk product factories with an installed capacity of 2.58 lakh litres are in operation. The average throughout of the liquid milk plants and the product factories has been ascertained to be around 62.5 and 79.2 per cent, respectively. In brief, the dairy industry in India has been established on the sound footing and the country has become self-sufficient in production of milk products.

SAQ 1

a) Trace the history of cattle development and explain the present status of milk production in India.

b) How the cattle breeds have been classified? Explain the characteristics of some of the notable breeds under each category.

c) What are the edible and non-edible animal by-products? Explain how they are contributing in the agricultural economy of our country.

d) Dairy industry in India has taken up its roots–Explain how it has developed in the Five Year Plan.

e) Dairying has not picked up as a commercial enterprise and is being practised as a secondary enterprises. Comment giving reasons of its slow development as compared to agriculture.

6.6 POULTRY DEVELOPMENT

The term poultry includes fowls, ducks, geese, turkeys, Guinea-fowls and pigeons, but it is more often used for fowls. The present day domestic birds are believed to have descended from Red Jungle fowl, which has its original home in India and its neighbouring countries. Aseel or Malay fowl is reported to have given rise to all the poultry breeds.

Classification of Breeds

The poultry population in this country can be classified in two types viz., the indigenous (Zebu or Desi) and the exotic, i.e., the improved type. The indigenous breeds include the breeds like Aseel, Karaknath, Ghagus, Bursa, Malay (Chittagong), Miri, Dao Thaigir, Brown Desi, Denki, Titri, Harringhatta Black, Kashmir Faverolla, Kalasthi, Lolab, Nacked neck, Punjab Brown, Teri and Tellecherry. The exotic breeds have been classified

according to their source of origin, viz., Asiatic, American, English and Mediterranean class. Asiatic class comprise of Brahma, Cochin and Langshan. The American class consists of Polymouth Rock, Wyandottee, Rhode Island, Red and New Hampshire, etc. The English class includes Sussex, Orpington, Australorp, Cornish, Dorking and Red cap. The Mediterranean class consists of Leghorn, Minorca, Ancona, Spanish, Andalusian and Butter cap etc. All these breed are available in India.

Population

The breedwise information on the total number of poultry birds across states is not available. However, the population of total poultry birds have been presented in Tables 6.10 and 6.11.

Table 6.10: Poultry Population Over Different Period in India

(Numbers in thousands)

Year	Number
1951	7,35,48
1956	9,47,59
1961	11,42,53
1966	11,54,45
1972	13,85,44
1977	16,80,70
1982	20,77,39

Poultry production was considered uneconomical owing to low egg production, low prices for eggs and chickens and fear of contagious diseases. However, poultry farming has become very popular because of small initial investment and quick return to investment. The data reveals that the population of poultry birds have increased by about 83 per cent in 1982 over that in 1966. The increase in population is very high in Andhra Pradesh, Haryana, Himachal, Maharashtra, Manipur and Rajasthan.

Table 6.11: Poultry Population in Different States in India

(Number in thousands)

State	1966	1982
Andhra Pradesh	14,715	32,392
Assam	8,936	10,941
Bihar	10,850	14,988
Gujarat	2,325	3,572
Haryana	479	2,014
Himachal Pradesh	206	461
J & K	1,535	2,407
Karnataka	8,277	12,097
Kerala	9,909	15,083
Madhya Pradesh	5,739	8,383
Maharashtra	9,902	19,844
Manipur	623	2,861
Meghalya	943	1,419
Nagaland	438	978

State	1966	1982
Orissa	7,698	10,676
Punjab	1,680	9,657
Rajasthan	865	2,219
Tamil Nadu	11,226	18,284
Tripura	663	1,079
Uttar Pradesh	3,771	6,858
West Bengal	12,818	28,670
Union Territories	1,847	3,296
Total	1,15,445	2,07,739

Description of Various Breeds

Though all the breed mentioned above are available in the country and are kept by the poultry breeders, but it would be of primary importance to discuss the various indiginous breeds being maintained and developed in the country. The description of the indigenous breeds with their common characteristics and the place of original are detailed below:

Indigenous Breeds

Aseel

The original Aseel is a medium-sized, round-bodied and a well built bird which is a native of Andhra Pradesh. It has a broad breast, straight back and strong tail root. The feathers are tough, close, scanty and almost absent on the face, breast, thigh and the first joint of the wings. Aseel have small beaks. The breed is famour for great stamina, majestic gait and dogged fighting qualifities. The standard weight of cock is 4 kg and that of hen is around 3 kg. The birds are poor layers but are reputed for their delicious meat. The breed was mainly kept by Kings and Nawabs and used to enjoy its fighting quality, but its importance in the present time has been reduced. The breed has several varieties depending upon their colour, viz. Peela (Golden Yellow), Yakub (Black and Red), Nurie (White), Kagar (Black), Ghita (Black and White spotted), Java (Black laced), Subja (White and Golden) and Reza (Light Red). Reza is the only light in weight and small in size variety.

Karaknath

This small sized-bird is native of Western Andhra Pradesh. The chicks have a peculiar colour variation from bluish black to reddish brown colour with dark head streak and more regular stripping over the back. The plumage in adult also ranges from silver and golden spangled to bluish black colour without spangling. The adult males and females have an average weight of 1.5 kg and 1.0 kg, respectively.

Ghaqus

A big-sized square-shaped bird usually available with the nomads of Karnataka and Andhra Pradesh in India. Its colour ranges from red to black or grey to brownish black. The legs are longer, smoky yellow and have no feathers. The birds have a single small pea-shaped comb with short wattles and ear lobes.

Busra

This is a medium sized bird and is found in central and western regions of India. The body colour varies widely. The breed has light feathers and semi-buttercup shaped comb with characteristic tuft of feathers on the head and grey legs. It is a poor layer and not much resistant to parasitic and other diseases.

Chittagong (Malay)

The breed is large in size with a broad breast and has a harder built, male weighing about 4 kg while the females weigh around 3.5 kg. Its original home is Bangladesh, but is also distributed in some part of Eastern India. The plumage is short, thick and white in colour with splash of golden markings on the wings. The birds have single and short comb, small head, long and yellow beak and white/yellow eyes. The birds grow fast and are considered ideal for table purpose.

Miri

This is a small sized bird and is found along with other types of indigenous birds in upper Assam area. These lay more eggs than other locally available desi poultry. The birds are usually maintained by the Miri Tribe, so the name after the tribe.

Dao Thaigir

This breed is found in lower parts of Assam and is reared by the Boro community. This is heavier breed with high growth rate and body weight at maturity. It is known for delicus meat. The name Dao Thaigir has been given by the Boro community.

Denki

This is fairly large-sized breed and is native of Vizagapatnam district of Tamil Nadu state. The glossy and lustrous appearance of red plumage makes it an attractive and handsome bird. The cocks have long necks and legs like a game fowl and have fighting qualities. They have single compressed comb which is rosy in colour. The average weight of male bird is 3.0 kg and that of female about 2.5 kg.

Titri

This breed has speckled and white feathers with yellow beak and legs. Females have comparatively smaller comb although it is erect in both the sexes. The birds have poor laying capacity. The average body weight of cock is 2.0 kg and that of hen about 1.5 kg.

Kashmir Faverolla

These birds are native of Kashmir. The breed has red and black feathers with yellow beak and legs. The hen is a fair layer and weighs about 2.0 kg. The weight of the cock too is around 2.5 kg.

Kalasthi

These birds below to Chittor district of Tamil Nadu, and closely resemble Denki but are shorter in size. These are attractive birds and have red lustrous plumage which is occasionally mixed with dark shades. The breed produces poor layers. The birds have inadequate dressing percentage which makes them less valuable for table purpose. The weight of cock is 2.5 kg and that of hen 2.0 kg.

Punjab Brown

This breed, a native of Punjab and Haryana states, is brown in colour with yellow beak, legs and feet. This bird is good for meat purpose since it grows very fast. The average weight of male bird is 3.5 kg and that of female varies around 2.5 kg. The cocks have fighting nature.

Teni

This is a common breed of fowl maintained in most parts of country. The breed has small size and a compact solid body. The feathers are light and wiry. The skull is fairly broad; beak is short, eyes bright and bold and the breast bone is well convered. This is an all purpose bird which suits for village conditions. The average weights of female and male are 1.5 kg and 2.0 kg, respectively.

It is found in Malabar region. The body is round in shape and the birds have black skin. However, the plumage colour is variable from black to gray. The breed produces fair layers who lay tinted eggs. The male birds weigh around 2.0 kg and the female around 1.5 kg. It is also used for medicinal purposes in the Indian system of Medicine.

Popultry Development in India

Popultry in India has been kept for meat and egg production, manure, cook fighting and aesthetic uses. The breeds like Aseel, Brown Desi, Nacked Neck and Punjab Brown are vanishing because of lack of interest due to ban on cock fighting. The others are being developed keeping in view their use as egg layer or meat producer, but manure is one common item which is available from all the breeds, alike as a by-product. The exact information about the degree of use, however, is not available.

In the present days, dual purpose breeds are vanishing. Most of the stocks used all over the world are crosses of one kind or the other. Majority of the stocks used for egg production are the corsses involving the strains or inbred lines of leg horn and to a limited extent of breeds like Rhode Island Red, California grey and Autralorp. For broilers, heavy breeds like White Plymouth, White Cornish and new Hampshire are being used to produce crossbred chickens. In the traditional system, the farmers in the villages were keeping a few poultry birds each, either on the farm by-products or they were leaving the birds open, who were picking their feed from the kitchen waste and other ingredients, but now it is fast moving towards commericialisation. In the changing scenario, several commercial poultry have come into existence, which are selling one-day old chicks, which are being kept by the producers on large sized units. At present, many foreign breeding concerns like Hy-Line (USA), Arbor Acres (USA), Shaver (Canada) and Uni-chix (Czechoslovakia) etc. are supplying chicks. In addition to this, innumerous hatcheries in the urban and sub-urban areas have cropped up. Since keeping male stock is uneconomical, so emphasis is on the sexed chicks. The poultry breeders maintain the chicks as per the objectives of their farms.

Poultry Breeding

The chicks stocks are bred keeping in view the objectives/purpose of breeding. The two main purposes being the egg production and meat production. The breeds being used for the purpose are considered keeping in view the economic characteristics. The various characteristics considered for breeding for egg production include eggs per bird, egg size, egg quality, albumin, weight, blood and meat sports, livability, fertility and hatchability. For meat production, the growth of the birds is the major indicator.

Breeding Systems

Several selection and mating methods are used for poultry improvement but most commonly used methods are:

a) In breeding and hybridization,

b) Strain crossing,

c) Reciprocal current selection, and

d) Closed flock breeding.

Mating Methods

Mating is done mainly by two methods, viz., the flock and pen matings. In the former system, a number of males are allowed to run with the entire flock of hens, whereas in the later system one male is allowed to run with 10-15 females in separate pens. These days artificial insemination has also been started and is in vogue.

Hatching of Eggs

In the past, eggs were hatched by placing them under the broody hens where only 10-12 eggs were kept at a time. But for large scale production, artificial hatching is being

practised. Incubators having capacity for several thousasnd eggs have been developed and are being used for commercial poultry farms.

Sexing of Chicks

In the past, no attention was paid on the sexing of chicks, but these days the sexing of egg type stock is done in day old chicks by vent method.

Finance for Poultry Development

Poultry plays a significant role in the Indian economy. As such, money for development purposes has been earmarked in the various Five Year Plan. The total amount allocated in various Plans is shown in Table 6.12.

Table 6.12: Plan Outlays for Poultry Development

Plan	Plan Outlay (million Rs.)
Second	28.00
Third	45.80
Fourth	115.00
Fifth	335.00
Sixth	745.95

It is apparent from the table that in the second Plan only 28 million was allocated but considering the importance in the subsequent plans, the amount was raised many folds. In short the plan allocation in the Sixth Plan was 27 times to that of the Second Five Year Plan.

Production of Products

Table 6.13 reveals that total output during various periods increased manifolds, which could be attributed to the various developmental activities and the financial allocation for development.

Table 6.13: Production of Eggs and Broiler in India

Year/Period	Egg Production (million eggs)	Broiler (millions)
1966	2149	-
1971	6040	4.0
1977	9800	17.0
1979	11583	-
2000	22966*	71.8

*Expected figures

6.7 SHEEP DEVELOPMENT

Sheep are unique among domestic livestock since they are reared for variety of purposes and can be maintained under diverse environmental conditions. Sheep are reared for wool, meat, milk and skin, but seldom for all at the same time. Sheep breeds can be classified into four groups, viz. fine wool 'Merino' and its derivatives; medium wooled sheep, originating of British; big lusture wooled sheep of British origin and carpet wooled varieties of Asiatic origin. According to estimated world wool production, 42 per cent production is from Merino breed, 38 per cent from Merino crosses and British breeds, while the remaining 20 per cent is carpet wool.

Description of Breeds

Considering the agro-climatic conditions of the Indian sub-continent, there are four main sheep rearing regions, viz. The Temperate Himalayan region, Dry Western region, Peninsular and the Estern region. The temperate Himalayan region comprises region of Jammu & Kashmir, Himachal, Hilly districts of Uttar Pradesh, Sikkim, Arunachal Pradesh states and inhibit Bhakarwal, Bhadarwah/Gaddi, Karnah, Poonch, Gurez, Rampur-Bushair and Blangir breeds. Dry western region includes Punjab, Rajasthan, plains of Uttar Pradesh, northern Gujarat and parts of Madhya Pradesh. The main breeds available in these areas are Lohi, Nali, Bagir, Malpura, Chokla, Magra, Marwari, Jaiselmeri, Muzzaffar Nagri, Bikaneri/Bimaneri, etc. The Peninsular region comprising of Maharashtra, Andhra, Karnataka and Tamil Nadu has important breeds like Bellary, Nellore, Mandya, Macheri, Ramnad, Madras Red, Nilgiri, Coimbatore and Trichi black. In the eastern region which covers Bihar, West Bengal, Orissa and Assam, etc. has no distinct breeds and the sheeps are mainly maintained for meat production. The detailed description to some of the breeds is given below:

Gaddi (Bhadarwah)

These sheep are small in size, very sturdy and good climbers. Rams are horned and ewes hronless. They have small tails and small ears. Mostly white with brown face.

Bhakarwala

The breed is bulky, but hardy and is an excellent climber. Rams are horned, ewes hornless. Their ears are generally long, broad and drooping. They are known as producers of coloured wool, the colour varying according to the location of flock.

Gurez

The breed is bulky in weight. Both horned and hornless sheep exist. The tails are short and broad. Ears are generally short. Ewes are good milkers. Several varieties of colours are found among this breed of sheeps but white predominates.

Rampur-Bushair

They are short statured with long drooping ears. Rams have typical Roman nose and are horned. Ewes mostly polled. The main feature of this breed is its fleece. Body weight of male is around 50 kg and that of female around 40 kg. Mostly white in colour with tan marking around the face.

Chokla

The breed known for fine wool is of medium size, square and compact. It has small head, which is dark brown in colour. The face is free of wool. The whole head is bread and strong with a distinct Roman nose. The ears are medium sized and finely shaped but the legs are short. The males and female weigh around 40 and 30 kg, respectively.

Jaisalmeri

The breed has large frame, which tends to be long and barrel shaped. Head heavy with typical Roman nose covered with black or dark brown hair. Ears are long and drooping. Legs are long. Tail is of medium size. Body weight of male is around 40 kg and that of female 35 kg. The staple length is long.

Marwari

They have medium to large frame. The head is covered with black hair. Ears are very small and twisted. Legs are long and thin. Body weight of males and females is around 40 and 30 kg, respectively. The fleeces are generally white. The staple length is generally medium in size.

Magra

They have a reasonably large frame. The head is medium in size, covered with white hair and light brown patches around the eyes. The ears are finely shaped, medium in size and tubular in shape. Legs too ar of medium size. Tail is short to medium length. Body weight of male is around 40 kg and of female 30 kg. The fleeces are generally white and medium in length.

Nali

They have large frame with plenty of depth. The head is compact. The forehead and the face is covered with light brown hair. The ears are large and leafy, the legs short and the tail long and tapering. Body weight of male and female is 40 and 30 kg, respectively. The fleeces are light yellowish in colour and long.

Pugal

They have medium sized square and deep frame. The head is of medium size and face is covered with black hair. There is a characteristic yellow arch above each eye brow. Ears are short and tubular and the nose straight with a flat muzzel. Body weight of male is around 40 kg and that of female 30 kg. The fleeces are generally bright white in colour and of good quality.

Sonadi

They have long and well-built bodies with light brown face, brown colour extending to the neck and limbs. Nose pronounced and the ears are large and drooping. They are good milkers. Body weight of males is around 35 kg and that of female 30 kg. The fleeces are generally flat white and hairy with a small staple length of average quality.

Patanwadi (Deshi or Kutchi)

Patanwadi sheeps are hornless. Their ears are tubular, medium sized drooping and turning inwards. The neck is short and this covered with fleeces of dirty white colour. Limbs are of brown or tan colour. Udder is large with well placed teats. Males and females weigh around 40 and 30 kg, respectively. The fleeces are generally yellowish white in colour and of medium to fine quality.

Deccani

This breed has a thin neck, a narrow chest, narrow face with Roman nose. Rams are generally horned. Ewes are generally hornless. Ears short to medium in length. Face is black or white black mixed.

Bellary

This breed is difficult to distinguish from deccani and cannot be considered separately. However, in southern parts of Tungabhadra, it is called Bellary. Most of these sheep are coloured usually black.

Hassen

This breed is broad and heavy and has lop ears and a Roman nose. Colour white, black or brown.

Ramnad

Light footed, bony, short tailed. Rams have twisted horns, ewes hornless. Average body weight is around 25 kg.

Trichy Black

The breed is black in colour, have small body and short tail. It is white in colour with black or brown patches over the face, ears, cheek and neck.

Coimbatore

Generally both rams and ewes are polled but some rams have horns. It is white in colour with black or brown patches over the face, ears, cheek and neck.

Nilgiri

The breed is medium built, very delicate, small and short in height, and a good climber. The body weight of male is around 28 kg whereas the female weigh around 20 kg. They produce finest fleeces of good quality with staple length of small size.

Mandya

It is large sized breed with two short wattles hanging near the neck. It has a brown patch on the head which extends upto the neck and the shoulder. It has long leafy and dropping ears, a short tail and a roman nose. Body weight of female is 30 kg and that of male 35 kg. The fleeces are generally brownish in colour and contain little wool.

Nellore

Nellore breed can be subclassified as (1) horned with white or brownish body colour, (2) red horned, (3) polled with red body colour. Horns are present in the rams of the first two categories, while the females are homless in all the types. They have a long face and long ears. They are large, well built and are said to be tallest in India. The females weigh 30 kg and males 40 kg. The colour of this breed is red or white with or without black colour. They produce hair.

Shahabadi

They are study, medium in height, long legged and distinct roman nose. Body weight of female is 25 kg and that of male 30 kg. Fleeces are white and of coarse type.

Chota Nagpur

Small body, thin legs, long neck, small tapering face and very short tail. Body colour varies from dirty white to light tan.

Muzaffarnagar

It is medium to large in size, hardy, pooled animal with long dropping ears, long legs, long tail and long face. Body is generally white, but patches of brown and black against white background are not uncommon.

Population Estimates and Trends

The distribution of sheep population in different states during the period 1951 to 1977 is presented in Table 6.14.

It could be observed from the table that there has been a progressive increase in sheep population from 1951 to 1966, but showed a decline in 1972. It again showed a small increase in 1977 but the increase in the subsequent period ending 1982 was significant. The population of sheep increased in almost all the states, except Andhra Pradesh, Kerala and Tamil Nadu. The increase, however, varied in different years in different states. The decrease in Kerala, however, was more pronounced as compared in other states. The reasons for the decrease are, however, difficult to explain. In the absence of break up of data among ewes, rams, youngs of exotic and crossbreds and indigenous stocks, it is difficult to analyse the trends in sheep population and for determining the progress of sheep development programme.

Sheep Rearing in India

Sheep rearing in India is being practised mainly by the small and marginal farmers and the landless labourers. In most of the sheep rearing regions, the sheep are maintained on pastures. Since the sheep breeders do not possess any land they lead a migratory life and move from place to place. Sheep migration is a regular feature with the breeders of

western arid districts of Jaisalmer, Barwer, Jodhpur, Pali, Jalore, Nagaur and Bikaner. They more in different directions in search of water and grazing lands. Due to this not only the head of family members are illiterate but their children also cannot avail the chance of getting education. Due to lack of education, they cannot adopt improved animal husbandry practices and improve the potential of their flocks.

Table 6.14: Distribution of Sheep Population in India

(thousand)

State	1951	1956	1961	1966	1972	1977	1982
Andhra Pradesh	10193	7846	8363	8004	8343	7064	7519
Assam	33	169	54	49	25	59	46
Bihar	908	1051	1156	1247	983	1150	1322
Gujarat	-	-	1481	1652	1722	1592	2357
Haryana	-	-	-	516	459	542	758
Himachal Pra.	627	697	662	1049	1040	1055	1091
J & K	979	1465	1163	1152	1072	1216	1909
Karnataka	4346	4060	4765	4748	4827	4536	4792
Kerala	432	98	23	12	10	3	7
M.P	687	901	1009	1016	1009	968	959
Maharashtra	-	-	2093	2205	2128	2636	2671
Meghalaya	-	-	-	21	18	20	26
Manipur	*	1	4	9	2	2	14
Nagaland	-	-	-	*	*	*	*
Orissa	682	1079	994	1182	1369	1431	1990
Punjab	-	-	-	444	436	498	611
Rajasthan	5393	7373	7360	8806	8856	9938	13431
Tamil Nadu	7926	7042	7160	6621	5615.	5289	5537
Tripura	1	7	3	2	2	3	5
U. P.	1636	1906	2462	2623	1956	2059	2307
West Bengal	622	611	535	639	808	793	1365
Union Territories	7	8	10	18	15	53	36
All India	38962	39259	40223	42015	40395	40907	48764

** Figures below 500*
Source: All India Livestock Census

Economics of Sheep Rearing

Very little information on the economics of sheep rearing in different agro-climatic regions of the country is available at present. However, a survey conducted by Central Sheep and Wool Research Institute in 1972 revealed that a farmer maintaining a flock of 100 breedable ewes, attendant rams and their followers of Chokla and Nali breed could earn an income of Rs. 3881 and Rs. 5642 per year, respectively. The major difference in the income of the two breeds was attributed to the difference in wool yield, number of lambs

born and their survival rate. The study also brought out that the income could be increased by about 25 per cent by crossing Rambouillet and Chokla breeds.

Wool Production

Reliable information on the total production of wool in the country is not available. However, the rough estimates have been prepared by various agencies which are mainly based on the total number of sheeps available in the country and adhoc estimates of average wool yield. The estimates thus available on the total production of wool from the adult sheep, lambs and pulled wool have been presented in Table 6.15. It could be observed from the table that the total production of wool in the country has increased from 27484 tonnes in 1951 to 35169 tonnes in 1972. This increase could be mainly attributed to the increase in total population of sheep and perhaps only a very small fraction due to an increase in wool yield as a result of sheep development programmes initiated in the Five Year Plans. The total value of otput from wool in 1980-81 was observed to be Rs.49 crores which has increased to Rs.124 crores in 1988-89 at current prices. If 1980-81 prices are considered, then the total output in 1988-89 was only Rs. 68 crores.

Table 6.15: Wool Production from Various Categories of Sheep (Tonnes)

Year	Adult sheep	Lambs	Pulled wool	Total
1951	21589	1794	2287	27484*
1956	24036	2835	2287	30972*
1961	25119	3335	2287	32555*
1966	2621	6 4640	2287	34957*
1972	25372	4032	2451	35169*
1977	NA	NA	NA	49000*

** includes 1814 tonnes of wool produced from migrating sheep, details of which are not available.*

Breeding and Development

Sheep breeding is practised to obtain an economic return from wool and mutton. A judicious selection of ewes and rams has to be made with due regard to pastoral and climatic conditions of the areas where the flock is maintained. The adaptability of sheep to the local conditions is the most important factor in selection of a particular breed or type, therefore, superior sheep from local flocks are selected to bring about the desired improvement in them. Generally, shepherds maintain a flock of 50-60 sheeps depending upon their capability, but in some areas some breeders become partners in mixed farming economy. Generally in India natural service is being practised and for mating one ram is kept for 30-40 ewes. The male: female ratio is generally 50:50. The majority of the progeny except those considered suitable for breeding is sold for meat. In large size and professional flocks, teaser rams are generally kept, but it is difficult to have a control over breeding owned by nomadic breeders, so superior rams proportionate to the number of ewes kept are maintained. The technique of artificial insemination has also been taken up but has not been extended to the field in large scale except in Rajasthan.

A serious attempt should be made to try out this technique in the breeding of sheep in different agro-climatic regions of the country in view of the large scale crossbreeding programmes that have been recommended for rapid increase in wool and mutton production.

SAQ 2

a) Discuss in brief the various breeds of sheep in the country.

b) Discuss how the sheep are maintained in the traditional system and the development achieved so far.

c) Sheep are mainly kept for landless entrepreneurs and has slow development. Discuss the reasons responsible for slow development.

6.8 PIGGERY DEVELOPMENT

India has a population of about ten million pigs which is less than 1 per cent of the total world population. Pigs are most prolific breeders and quick growers farrowing 10 to 12 pigs at a time. They are a valuable source of rich animal protein at a very low cost. The carcase return is also very high and ranges between 65 to 80 per cent of the live weight.

Pigs were maintained in the country for the production of bristles, which was an important export product and the meat was considered as a by-product, but with the advent of nylon, bristle market has suffered a big jolt and now the pigs are reared basicaly for meat/pork production. Pig meat contributes less than 10 per cent of the total meat produced in the country.

In India, pigs and pork industry is in the hands of traditional pig keepers who belong to the category of economical weaker group with little resources to undertake the enterprise on scientific lines In the urban areas these are raised on garbage, kitchen waste and human excreta. They are let lose in the day to feed for themselves. In the evening, when they return back they are housed in katcha and mud structures In some of the areas, there is a practice to leave them immediately after farrowing and the strength is monitored on every Sunday. They are collected back only after one year when they gain a weight of 30-40 kg. These are slaughtered and fresh pork is sold. In eastern states, however, there is a practice of keeping them in herds of 15-30 and the farmers identify them at birth by notching. However, some change has taken place since early sixties with the establishment of some breeding farms in the public and private sector. The bacon factories for processing pork too have been established.

Pig Breeds

No attempt has been made to catalogue the various breeds and strains of pigs in the country. In India, most of the breeds are evolved from wild pig. Like the other cattle, pigs breeds to can be divided into three catogiries, viz., indigenous/desi breeds, exotic breeds, and crossbreds.

Among the indigenous breeds the prominent breeds include Deshi, Ghori and Ankamali pigs. Among the exotic breeds which have been tried in India include large White Yorkshire, middle white Yorkshire, Lendrace, Saddleback, Tamworth and Berkshire. Of these, the large white Yorkshire and Lendrace are being used very widely whereas the remaining breeds are being used in small pockets spread over the length and breadth of the country. The description of some of the breeds has been given below:

Indigenous/Desi Breeds

The prominent breeds under this category are as below:

Desi Pigs

Desi pigs are the natives of northern and central India covering Punjab, Uttar Pradesh, Madhya Pradesh and Bihar states. It is large in size, grows at a slow pace, rusty grey to brown in colour and weighs around 160 kg. The sow farrows 8-12 piglets at a time.

Ghori

The Ghori breed is widely distributed in the eastern states comprising of Bhutan, Sikkim, Meghalaya, Arunachal Pradesh, Nagaland, Manipur and Mizoram. These are mainly black with an admixture of light brown in colour.

Anakamali

It is a predominant breed of south-east India covering the entire Kerala, Tamil Nadu, Karnataka and Maharashtra. It is medium in size, black with white patches in colourand thick hair. Farrowing rate is very high and a female sow farrows 12-15 piglets at a time.

Exotic breeds

The imported breeds which have been tried in India and are being maintained for the production of pure bred stock of pigs in the various pig farms set up by the state governments is as below.

Large White Yorkshire

The breed is a native of England imported to India from U.K. and Australia. It is a prolific breeder and excellent breed for crossbreeding. The female have a good milking ability. It is solid white in colour but occasional black pigmented spots can also be seen. It is large in size and a mature male weighs around 350 kg whereas the female weighs around 280 kg.

Middle White Yorkshire

This breed is a cross of large and small White Yorkshire breed. As is apparent from the name itself, the breed is white in colour, medium in weight, hardy and has the quick growth rate and high dressing percentage. A male when full grown weighs around 275 kg while the female weighs about 225 kg.

Lendrace

It is a bacon breed having its origin in Denmark and is considered superior to large white Yorkshire. It is an excellent breed for crossbreeding. Its colour is generally white with black skin-spot freckles. The males weigh around 320 kg but the weight of the female is around 270 kg.

Saddleback

This breed too has its origin in England and is easily adopted for pork production. This breed is easily distinguishable from other breeds since it is black in colour but its forelegs are white and has a continuous belt of white hair over the shoulders. It has a robust make up and is quite heavy in weight.

Tamworth

This breed too as is indicated from the name itself belongs to the Tamworth town in England. It is a good bacon type breed and is well known for its hardiness and vigour. Mature males weigh around 280 kg while the weight of the female is about 250 kg.

Berkshire

It is medium sized English breed having good meat quality. It is black in colour with white patches on the face, feet and tail. Full grown males weigh around 325 kg and the sows weigh around 250 kg.

Pig Population

Indian pig population in 1982 has been estimated at about 10 million, which is almost one and a half times to that in 1972 (Table 6.16). The population has increased in almost all the states except Arunachal Pradesh, though at different rates. Uttar Pradesh and Bihar are the leading states and almost one third of the total pig population belongs to these two states. Andhra, Assam and Tamil Nadu are the other states which follow Uttar Pradesh and Bihar in respect of pig population. As compared to this, J & K possesses the minimum number of

pigs. The information regarding the crossbred population for all the states could be assessed around 9.20 per cent of the entire population. However, in 1987, this has shown a slight increase to about 10.5 per cent. The statewise proportion of crossbred and indigenous population (Table 6.17) shows that maximum crossbred population is available in Mizoram, Manipur and Haryana. But in highly populated areas like Uttar Pradesh, the percentage of crossbred population is around 12 per cent. The percentage of crossbred population is the lowest in Orissa followed by Madhya Pradesh and Bihar.

Table 6.16: Population of Pigs in Different States of India

(in thousands)

S. No.	State	1972	1982
1	Andhra Pradesh	690	786
2	Arunachal Pradesh	411	213
3	Assam	397	578
4	Bihar	879	1043
5	Gujarat	008	172
6	Haryana	143	250
7	Himachal Pra.	003	008
8	J & K	001	003
9	Karnataka	261	319
10	Kerala	129	127
11	M.P	343	474
12	Maharashtra	203	302
13	Meghalaya	127	207
14	Manipur	134	368
15	Mizoram	048	077
16	Nagaland	111	248
17	Orissa	387	418
18	Punjab	046	220
19	Rajasthan	117	180
20	Tamil Nadu	563	694
21	Tripura	044	103
22	U. P.	302	2282
23	West Bengal	362	768
24	All Islands	090	096
25	Delhi	011	021
26	Pondichery	002	003
Total		6896	10072

Breeding and Maintenance of Pigs

There are a number of breeding systems that are being followed in rural setting and on organised farms.

On organised farms in rural and urban areas, the males are kept along with females without restraint. Young boars in the age group of 8 months to 18 months are generally used for breeding purposes. The age of maturity in females is around 18 months if they are fed and

looked after well. August-September and February-March are the breeding seasons for pigs and the gestation period is 113 days. They come into heat between 5-7 days after the little is weaned.

On organised farms managed by the state Governments and other large producers, the methods generally used are between 5-7 days after the little is weaned.

Selection and Outcrossing

This is a most common method of breeding and multiplying followed at the breeding in rural setting alike. The procedure is intensive selection and mating of unrelated individuals of the same breed. Outcrossing is also practised when a new trait is to be introduced in the herd.

Crossbreeding

Crossbreeding is being followed in certain areas which are in the neighbourhood of bacon factories. The breeds generally used are the Yorkshire and Landrace. Both single and criss-cross methods are in vogue. Studies have revealed that crossbreeding has increased the litter size, livability and growth rate.

Table 6.17: Percentage of Crossbred and Indigenous Population Across Different States of India (1982)

Sl. No.	State	Crossbreed	Indigenous
1.	Andhra Pradesh	2.16	97.84
2.	Arunachal Pradesh	NA	NA
3.	Assam	12.46	87.54
4.	Bihar	2.40	97.60
5.	Gujarat	2.33	97.67
6.	Haryana	32.00	68.00
7.	Himachal Pra.	25.00	75.00
8.	J & K	NA	NA
9.	Karnataka	10.34	89.66
10.	Kerala	9.45	90.55
11.	M.P	1.48	98.52
12.	Maharashtra	9.93	90.07
13.	Meghalaya	34.78	65.22
14.	Manipur	NA	NA
15.	Mizoram	54.54	45.46
16.	Nagaland	22.58	77.42
17.	Orissa	0.72	99.28
18.	Punjab	NA	NA
19.	Rajasthan	4.44	95.56
20.	Tamil Nadu	3.31	96.69
21.	Tripura	4.85	95.15
22.	U. P.	11.57	88.43
23.	West Bengal	10.94	89.06
24.	All Islands	19.79	80.21
25.	Chandigarh	66.67	33.33
26.	Delhi	NA	NA
Overall		9.20	90.80

Development Programmes

Piggery development in India has received poor attention from the government. Only towards the end of Second Five Year Plan, a coordinated project on piggery development was taken up. Under this project, pig breeding stations, bacon factories, pig breeding farms and piggery development blocks were earmarked. The composite projects have been started in Andhra Pradesh, Bihar, Kerala, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal. A small bacon factory has also been set up in Punjab. Under the piggery development block scheme, swine production in the rural areas is being organised. To develop the breeds, almost all the states have established their own pig breeding farms.

Marketing

The existing marketing conditions of pork and pork-products even though these are being used by a vast majority of Indian population is unsatisfactory and unhygienic. Though an effort has been made by certain selected farms in the country in the public and pirvate sector but the market has to be explored. The product produced of a good quality and packed under hygienic conditions can find a place in the home as well as foreign markets and can serve as a good foreign exchange earner.

SAQ 3

a) Discuss the various breeds of pigs available in the country giving their important characteristics.

b) Piggery has been given very little attention so far. Discuss how the breed can be developed to earn lot of profit and foreign exchange.

6.9 FISHERY DEVELOPMENT

For the non-vegetarian population of the country, fish constitute an important source of animal protein. In general, fish contains 66 to 84 per cent water, 15 to 24 per cent protein, 0.1 to 22 per cent lipids as and 0.8 to 2 per cent minerals. It also contains minute quantities of sugar and glycogen. Among the minerals, potassium, sulphur, phosphorus, chlorine, sodium, calcium and magnesium are worth mentioning. It also contains iron, copper, iodine, flourine, manganese, zinc and lead though in traces. About 56 per cent of the Indian population eat fish is available at reasonable price. Assuming that half of the 85 g of animal protein required per head per day as stipulated by the Nutrition Advisory Committee would be contributed by fish, the present yearly requirement would be around 9 million tonnes of fish. The total production of fish from all resources has been estimated to around 3.7 million (1987), which is far below the nutritional requirement. Vigorous efforts are to be made to bridge up the gap between the requirement and production.

Population Trend

The population trend of the fish available from all the resources has been presented in Table 6.18.

It could be observed from the table that in 1951 the population of fish was around 0.75 million, which has increased to 2.9 million in 1986. The trend showed that it increased in the initial stage but decreased in 1961, but thereafter it has shown a continuous increase. The increase in the population from1951 and 1986 has ascertained to about 289 per cent. The percentage of fresh water to the total fish was about 41 per cent.

Firshery Resources

The fishery resources can be categorised under two broad heads, viz., the Inland Fishery including the estuarine and the marine fishery.

Inland Fishery

India has vast inland water resources spread throughout the country. Inland fish production in India has registered an increase from 218 thousand tonnes in 1951 to 1205 thousand tonnes in 1986. Eighty per cent total fish production in the country is from the West Bengal, Tamil Nadu, Andhra Pradesh, Bihar and Karnataka. The term inland fisheries is generally used to include both fresh water and Brackish water resources. The fresh water resources include reverine systems, reservoirs, ponds, tanks and Ox-bow lakes. The brackish water resources comprise of fishers in estuaries, lakes and back waters. The inland fishers can be further divided into capture fishery and culture fishery, the later being more important.

Table 6.18: Fish Catch and Landings - by Group of Species

('000 tonnes)

Year	Fresh water fish	Flounder Halibat, Sole etc.	Herring, Sardines, Bonitos, Tanas, etc.	Misc. Marine Teleousteans	Shark, Rays, Sakes, etc.	Crust-aceans	Total catch and landings	Total
1951	218.0	6.8	143.8	129.8	147.2	29.6	76.8	752.0
1956	293.5	10.5	114.0	56.8	356.1	21.9	159.5	1012.3
1961	277.4	14.1	244.2	73.3	253.6	33.6	64.8	961.0
1966	477.5	7.4	388.4	90.3	271.8	37.4	94.6	1367.4
1971	690.2	11.4	334.4	273.6	342.3	41.3	158.4	1851.6
1975	783.8	13.1	358.5	114.6	656.1	85.9	253.9	2265.9
1980	887.5	11.3	361.8	173.7	671.2	67.4	269.3	2442.2
1984	1082.3	22.5	523.4	163.8	778.3	62.6	228.8	2861.7
1985	1090.1	18.2	437.4	180.6	783.1	60.2	254.7	2824.3
1986(P)	1204.8	13.0	442.0	156.3	813.4	58.5	233.7	2921.8

Source : Fisheries Division, Department of Agriculture and Co-operation, Ministry of Agriculture.
Note: Totals may not tally due to rounding off of the figures.

Capture Fishery

The major carps among the capture fisheries include Catla (Catla catla), rohu (Labeo rohita), Calbasu (L. calbasu), mriga (Cirhina mrigala), Barbus spp, Cat fishes, air breathing fishes, mullets, prawns, feather backs, hilsa and bekti etc. Ganga river system is the richest fresh water system which breeds fauna, masheer, the Gangetic carp, Hilsa and several other species of commercial importance. The Brahmaputra, Indus river system, the trout streams of Kashmir and the Mahanadi, Krishna, Cauvery, Narbda and Tapti too have several varieties of carps, cat fishes and prawns.

While the major carps are confined to fresh water, cat fishes, mullets and prawns are found in brackish water too. Hilsa is a marine species which ascends rivers for spawning purposes and the fishery is based on this extensive spawning migration. With the construction of dams on some of the rivers, it is likely that these developments might in the long run affect the fishery. However, the researchers have shown that there is a possibility of artificial fecundation of Hilsa and subsequent rearing of these in ponds. This process will open up possibilities of culturing them.

Culture Fisheries

Though there are several reservoirs and lakes in the country, the production of fishery per unit area is very low. These offer scope for both capture and culture fisheries. Most of our reservoirs are stocked annually, but in many cases the fishes breed either in the reservoir itself or in the streams and tributaries which drain into the reservoirs. Culturing of fisheries in West Bengal, Orissa and Bihar has been in vogue for centuries in tanks, ponds and reservoirs etc. These practices, however, have been based on the experience accumulated over several years. Some of the Indian and exotic major carps introduced for culture are as below:

a) **Indian Carps**

The characteristics of some of the Indian carps being cultured are as below:

i) **Catla (Catla-catla)**

It is the fastast growing and largest major carp fish of India. It has characteristic wide upturned mouth with prominent lower lip, broad head and body is comparatively deep and stout. Lips are not fringed and are devoid of barbels. Fins are very dark grey except the base of pectoral which is pasler.

It is a surface feeder and at finger lings stage, it feeds on water fleas, planktonic alage and some vegetable debris where as adult fish is plankophyagus and feed on crustaceans, alage, plants, insects and vegetable debris etc.

ii) **Rohu (Labeo rohita)**

It is the second fastest growing carp fish. It is relatively small and has pointed head; mouth terminal with thick and fringed lower lip, dull reddish scales on the sides and pink reddish fins. It is predominantly column feeder. At finger lings stage, it feeds on vegetable debris, microscopic plants. The adult fish feeds on decayed higher plans, detritus and mud.

iii) **Mrigal (Cirrhinus mrigala)**

It has a linear body, small head with blunt snout, wide terminal mouth with thin non-fringed lips, bright silver body and reddish fins. It is bottom feeder and omnivorous. Finger lings as well as adult fish feed on decayed plant and animal matter, algae, detritus and mud, etc.

b) **Exotic Carps**

The exotic carps, which are being widely cultured in India are:

i) **Silver Carp (Hypophthal michthys molitrix)**

This Chinese fish is surface feeder and subsists on Flogellata, Dinoflagellata, Mycophceae, Bacillariophyceae, Protozoa and Ratifera supplemented with decayed macrovegetation and detritus. Its body is covered with small silvery scales. It has lower jaw slightly protruding upward, origin of dorsal fin behind ventrals, midway between tip of snout and base of caudal.

ii) **Grass Carp**

This fish too is of Chinese origin. It feeds on plant, viz., Hydrilla, Azolla and Salvinia. It can be fed on green fodder and land grass etc. also. The characteristic feature of this variety are: long body cover with large scales, broad head with short round snout, mouth sub-terminal and colour of the body dark grey above and silvery on the belly.

iii) **Common Carp (Cyprinus carpio)**

This fish too is bottom feeder and feeds on vegetable matter and decayed plankton. The mouth is terminal, lips thick and also can be projected forward. It has four barbels on the upper lip.

Marine Fisheries

India occupies a pre-eminent position in marine fish production. There are several ancillary resources such as molluses, echinoderm, sea weeds, which are either under exploited or unexploited. A characteristic of the Indian fisheries is the dominance of pelagic or mid-pelagic fisheries. Of these two, the bulk of fisheries comprise the clupeoids, a variety of Sardiness and the Indian mackerel.

Though India is surrounded by sea from the east, west and south, there is considerable regional variation both in quality and quantity aspects. On an average, 75 per cent of the fish catch is landed from the west coast.

The marine fisheries include the Sardines, Mackerel, Crustaceans, Bombay Duck, Elasmobranchs, Tunas, Molluses, Polynemids, Sciaenids, Silver Bellies, Cat fishes, Ribbon fishes, Anchovies, etc. The important characteristics of some of these are as below.

Sardines

These are the most important constituents of our pelagic fisheries and form 26 per cent of the total marine fish landings. This group comprises a larger number of species, but oil Sardine is the most important, which is found in abundance along the Kerala and Kanara coasts. The fish attains maturity when 150 mm in length and grows to about 225 mm. The characteristic feature of this species is the erratic behaviour and wide fluctuations ranging from 1 to 33 per cent in different years.

Mackerel

This is another important pelagic fishery available along the west coast from Ratnagiri to Cape Comorin. The firshery forms 9.5 per cent of the total marine fish production. It attains maturity when it is about 20 cm in size but grows to about 26 cm in length. Bulk of the fish is consumed in fresh condition, but a small quantity is being canned and marketed.

Bombay Duck

It is a localised fishery of Maharashtra and Gujarat coasts. However, it is available in small quantity on the West Bengal, Orissa and Coromandal coasts. About 11 per cent of the total marine fish production is accounted for by the Bombay duck. The fish attains a maximum size of about 33 cm and is highly carnivorous. Very little of this species is eaten fresh. Eighty per cent of the total catch is sun dried, stored and consumed when required.

Crustaceans

Prawns, Lobsters and Crabs constitute the crustaceans fishery. The prawns are the most important and the production is around 15 per cent of the world production and ranks second only to that of USA. The commercial prawn fishery is classified into two groups, viz., the large sized and small sized species. Lobsters came into prominence as a commercial fishery only in sixties. It is prevalent in certain regions along the rocky patches of west and east coasts, the most important being the south-west coast. Crab fishery is unexploited in India. These are landed mostly in northern Kerala, central Maharashtra and southern Tamil Nadu coasts. Attepts have been made and many new resources of prawns have been explored in deep waters. It is an export product and large quantities of prawn have been exported to USA in the past.

Tuna

This fishery is unexploited in India and the major resources is Indian ocean. Some of the species are found in abundance along the shelf waters.

Elasmobranchs

These comprise of sharks, rays, dog fishes and skates and are found on both the coasts, and more particularly from Kathiawar to Maharashtra, Kanara and Kerala coasts, southern and northern sections of east coast and West Bengal. These form about 4 per cent of the total marine fish landings. The important commercial use of these species is the extraction of

their liver oil, which is extremely rich in vitamin A. These are also being used for making fish meal and manure and a foreign exchange earner.

Molluses

The importance of this species is not fully exploited. Apart from being an item of food, it has many industrial uses.

Miscellaneous Fisheries

In addition to the above species, there are several other fisheries which are found along the coasts of India, the prominent of them are Sciaenids, White baits, Ribbon fishes, Cat fishes, Carangis, Pomfrets and Leiognathids etc. These are yet to be commercially exploited.

Marketing of Fish

Fish is a highly perishable commodity and the production vary not only from year to year but within the year from season to seasons. Hence, there is a need for proper marketing facilities, but till today there is no organised market, though attempts have been made to form Fishermen Co-operatives and State Fisheries Corporations. Fish is marketed as fresh, in frozen form, curred, canned and miscellaneous other forms. The distribution of fish catch over different years is presented in Table 6.19.

It could be observed that about 67 per cent is marketed fresh and another 7 per cent in the frozen form. Nearly 16 per cent is curred, while only a very insignificant amount, i.e., nearly 0.04 per cent is canned and sold. The remaining about 9 per cent is sold for miscellaneous purposes.

Table 6.19: Distribution of Fish

('000 tonnes)

Year	Marketing fresh	Freezing	Curred	Canning	Reducion	Misc. purposes	Offal for reduction	Total
1951	320.0	-	380.8	-	49.6	-	-	751.1
1956	432.3	-	513.2	-	66.8	-	-	1012.3
1961	460.4	-	419.9	-	80.7	-	-	961.0
1966	963.1	26.2	299.7	7.8	52.8	11.1	6.7	1367.4
1971	1222.4	97.9	358.7	13.1	102.9	53.5	3.1	1851.6
1975	1564.0	73.0	436.3	4.6	141.5	42.7	3.8	2265.9
1980	1591.6	144.6	512.9	5.2	125.5	48.4	14.0	2442.2
1984	1987.5	207.0	424.1	13.6	194.8	34.3	9.4	2861.7
1985	1843.3	196.4	562.2	9.8	170.0	28.5	14.0	2824.3
1986(P)	1963.9	209.7	460.4	12.1	158.3	105.8	11.6	2921.8

Source : Fisheries Division, Department of Agriculture and Co-operation, Ministry of Agriculture.
Note: Totals may not tally due to rounding off of the figures.

As far as the internal marketing structure is concerned, the catch is transported to the market, directly to the consumers or the processing points by bicycles, headloads, by road transport and railways. It is also transported by carrier vessels, but the prawns are transported in insulated vans.

The price structure varies from place to place depending upon the demand and supply of the products. Broadly speaking it varies from season to season, variety to variety and location to location and market to market depending upon the demand and supply of the product and the quality preferred.

To develop the fisheries, an organised attempt has been made in 1947 by setting up Central Marine Fisheries Research Institute and Central Inland Fisheries Research Institute at Barackpore. Not only this, to develop the processing part, Central Institute of Fisheries Technology was set up in 1957. All these three Institutes were assigned the task of conducting the research and development work related to their area. In addition to these Central Institutes, Fisheries Education was started in Bombay in 1961. The Institute provides training at post-graduate level and had its regional centres at Agra and Hyderabad. Central Institute of Fisheries Operatives was established in Cochin in 1963 with the basic objective of training operatives of different skills in theoretical and practical fields. This Institute imparts training to skilled personnel required to man and maintain the high sea-fishing vessels, viz., Skippers, Fishing Mates, Marine Engineers, Electronic Engineers, Gear Technicians, Boat Building Foremen, Shore Mechanics and Radio Telephone Operators, etc.

Not only this, to develop the marketing aspect, processing plants, cold storage plants and ice factories have been established in various parts of the country and along the production points for creating the storage facilities to avoid losses.

Indigenous non-mechanised vessels have been replaced by mechanised fishing boats, several fishing harbours have been set up. Landing and berthing facilities have been provided at several places. In short, lot is being done for the development of fisheries in the country but still we have to go a long way in this direction. The unexploited resources are to be exploited, the entire process is to be mechanised to increase the efficiency and technology in the processing and curring of the fishery evolved.

SAQ 4

a) What are the different fishery resources in India? Mention various fishery breeds and their source of availability.

b) Fishery is very important from nutrition point of view but has not received the proper attention. Discuss how the population of fisheries has grown over years.

c) Discuss the history of fishery development in India.

d) How the fish is marketed in India. Discuss the various marketing practices being practiced in the country.

e) To develop the fishery, culture fishery is to be given incentive and priority in our develop work. Comment.

6.10 CATTLE INSURANCE

Insurance as a device for transferring of risks and as a measure of financial security against life and property is well established in industries and business . Cattle insurance is a device to meet problem of livestock mortality in farming and protect the investment of the farmer in his livestock. It spreads the losses over many persons, over many years and over, many areas. It enables the farmer to substitute a regular annual premium cost for irregular losses. It strenghens and protects the credit of the farmer and adds a measure of security to dairy farming as an occupation. Thus cattle insurance is device to take some of the gamble out of livestock raising.

Growth of Livestock Insurance

Insurance against risk of livestock mortality which is said to have been practised in Babylon, is one of the oldest forms ever practised in the world. Its most extensive development took place in France, Germany, Italy, Sweden, Denmark, etc. countries of continental Europe. Besides joint stock insurance companies, cooperative and mutual insurance societies have also played a significant role in these countries. The specific reasons for the development of livestock insurance in Europe were:(i) farming is mainly livestock based, (ii) the initiative and efforts of governments in developing the insurance of livestock through various means such as payment of subsidy, facilities for liberal rules and procedure, and (ii) low cost of insurance organised through cooperative and mutual societies.

Livestock insurance is, however, little developed in Asia, with the exception of Japan. Unlike crop insurance, India and Burma had one time a number of cattle insurance societies run on co-operative lines. But these societies gradually disappeared. The last of such society functioning in India, was in the state of Bombay in 1940-41.

In 1948, Mr. G.S. Pirolkar was appointed to prepare a scheme of cattle insurance in India alongwith the scheme of crop insurance. A detailed plan was submitted to the Government in August,1949 but no action could be taken. Proposals were again formulated in the Third Five Year Plan to conduct pilot projects.

Prospects and Problems

India accounts for about 20 per cent of the world cattle and 50 per cent of the total world population of buffaloes. Inspite of such a large share of world's cattle, the total milk production is far short of requirements of our country. Considerable importance is, however, being attached now to the important task of developing animal husbandry and dairying programmes. The National Commission on Agriculture, in its interim report, has recommended that as a method for providing rural employment and increasing milk production in the country, dairying be encouraged in holdings of small farmers, marginal farmers and also by landless labour to the extent of effecting 4 million farm families. The need for crossbreeding has been fully recognised by the I.C.A.R and various Research Institutes and Agricultural Universities engaged in cattle development. A number of projects with foreign collaboration are underway in different parts of the country and are crossbreeding the local cattle with exotic semen. Various cattle development projects have also been undertaken by the Government under the Five Year Plans. In the context of these programmes, cattle insurance has to play a vital role as they involve linking of credit police of the various financial institutions, including the Nationalised banks and the co-operatives.

Many factors have hampered the rapid progress of cattle insurance in India, the important among them are:

a) Enormous cattle population,

b) Cattle ownership is widely dispersed, stray cattle are in large numbers and there are nomadic breeders owning large herds in certain parts of the country,

c) Milk production is only a supplementary enterprises and so far fails to satisfy the criteria of being economic,

d) Acute shortage of feed and fodder,

e) Lack of effective disease control,

f) Absence of controlled breeding, and

g) Lack of reliable statistics in regard to mortality rate among cattle in India which forms the very basis of insurance operations.

However, the increasing use of scientific farming and dairy management and the demand created by the lending policy of various financial agencies have given an impetus to the development of cattle insurance in India. The increasing demand of milk because of the delicencing and establishment of a large number of dairy units in the country is also working as an incentive of keeping more animals, needing more finance and help from the financial institutions.

Cattle Insurance Policy

The usual cattle insurance policy is designed to provide cover in respect of the death of the insured animal during the currency of the policy either due to accident or disease. However, the policy does not cover death which is caused, directly or indirectly by

a) transport by air or by water or by inland waterway;

b) rinderpest, blackquarter, haemorhoagic-scepticaemia;

c) delivery, breeding or castration or any surgical operation (or inoculation shall become necessary due to any accident occurring or illness manifesting itself during the currency of the policy;

d) poisoning;

e) nuclear hazards;

f) slaughter of the animal without the written consent of the insurers;

g) disease contracted within 15 days from the date of commencement of the risk;

h) riots, strikes, civil commotions or confiscation or destruction by the order of any government, public or local authority; and

i) war and kindred risks.

It is a condition of the policy that:

a) the insured animal shall be in sound health and free from any injury or physical disability at the commencement of the insurances;

b) the insured at all times shall provided proper care and attention to the insured animal;

c) it shall remain within the geographical limits stated in the policy; and

d) it shall be employed only for the use stated in the proposal form and specified in the policy.

The other conditions of the policy relate to, inter alia, the right of the insurer to cancel the policy and settlement of differences under the policy through arbitration.

The cattle insurance contract, is essentially, one of the indemnity, and the amount for which the animal is insured is not to be considered as the agreed amount automatically payable in the event of a claim. The sum payable on the death of the animal is the market value at the time of accident or of the manifestation of the disease or illness or the sum insured, whichever is less. Further, the value of salvage, if any, is also taken into consideration. The cost price, date of purchase and the present market value of the animal insured, are ascertained at the time of proposal to ensure that the sum insured is reasonably fixed.

Business of Cattle Insurance

Inspite of the difficulties encountered, a few firms came forward to introduce cattle insurance in some parts of the country in the sixties. Laxmi Insurance Company in the north was one such firm. But these firms had to close down their business for lack of support from the public. After the nationalisation of General Insurance in the country, four subsidiaries of the General Insurance Corporation of India have been authorised to undertake cattle insurance in the areas demarcated for each one of them. The names and addresses of the firms and the area demarcated is given below:

Sl.No.	Name and address of the firm	Area demarcated
1.	National Insurance Co.Ltd., No.3, Middleton Street Calcutta.	Assam, West Bengal, Orissa, Manipur, Nagaland, Tripura, and Mizoram, Andeman & Nicobar Islands.
2.	New India Insurance Co.Ltd., 87,M.G.Road, Bombay 400023	Gujarat,Madhya Pradesh Maharashtra, Nagar Haweli,Goa, Daman & Diu
3.	Oriental Fire and General Insurance Co. Ltd., A/25-27, Asaf Ali Road, New Delhi 110001.	Haryana, Madhya Pradesh Jammu & kashmir, Punjab Rajasthan,Uttar Pradesh Chandigarh & Delhi
4.	United India Fire and General Insurance Co.Ltd. SIAC Bldgs. 24, Whites Road Madras 24.	Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Lakshadweep and Pondicherry

Certain terms and conditions of cattle insurance are generally followed by these firms. In the later years, the area demarcation has been removed and now all the companies are operating in the entire country.

Settlement of Cases

In the event of the death of the insured animal, the insured shall immediately give notice to the insurer and shall arrange post-mortem examination by a qualified veterinary surgeon. If a post-mortem examination is not possible, a panchnama report on the death of the animal duly countersigned by a qualified veterinary surgeon shall be submitted. In the event of illness or accident to the insured animal, it is the duty of the insured, to provide at his expense, adequate treatment.

Owing to reasons indicated earlier, underwriting of this class of insurance is still is a stage of experimentation and development. It has been further extended to cover Poultry, Sheep, Goats, Pigs and Camels also. In addition to this, it has also undertaken the insurance of horses, ponies, donkeys, yaks and elephants. For each category of bovines, separate rates and conditions are fixed. The conditions laid down by United India Insurance Co. Ltd. for all these categories of animals have been given in Annexures.

The information about the animal to be insured is elicited in a printed proposal form which has to be completed by the insured. Other data required to be given in the proposal form relates to:

1) sex, breed and colour;

2) date of purchase, price paid by proposer, present market value and sum proposed for insurance;

3) number of calvings, date of last calving, milk yield per day;

4) the purpose for which the animals are used;

5) particulars of stable conditions and veterinary facilities available in the area; and

6) past losses of animals and the causes thereof.

The proposal form has to be accompanied by a certificate from a qualified veterinary surgeon. This certificate would cover the following points:

1) Past and present health condition of the animal;

2) stable conditions; and

3) whether vaccination is necessary, and if so, against which disease.

6.11 SUMMARY

In this unit we have discussed about Dairy Farming, cattle breeds, pattern of milk production and milk products, animal by-products, development of Dairy Industry in India,

poultry development, sheep, piggery and fishery development, and finally, it dealt with the cattle Insurance. In this unit, we also described the efforts made during Five Year Plans for Dairy, sheep, piggery and fishery development. We also discused about the growth of livestock insurance and it's prospects and problems.

6.12 ANSWERS TO SAQs

Refer relevant text for answer.

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